WHAT IS CLAIMED IS:

1. A method of etching silicon carbide, comprising:

providing a silicon carbide substrate;

forming a non-metallic mask layer by applying a layer of material on the substrate;

patterning the mask layer to expose underlying areas of the substrate; and

etching the underlying areas of the substrate with a plasma at a first rate, while etching the mask layer at a rate lower than the first rate.

2. The method of claim 1 wherein providing a silicon carbide substrate comprises providing a substrate having a layer of polycrystalline silicon carbide disposed thereon.

3. The method of claim 2 wherein providing a silicon carbide substrate comprises providing a substrate having a layer of polycrystalline 3C-SiC disposed thereon.

4. The method of claim 1 wherein forming a mask layer comprises applying a layer of silicon dioxide to the substrate.

5. The method of claim 4 wherein applying a layer of silicon dioxide comprises depositing the silicon dioxide layer using a low pressure chemical vapor deposition ("LPCVD") process.

6. The method of claim 5 wherein said LPCVD deposition process is carried out by using SiH_4 and O_2 gases at a temperature of approximately 450 Deg. C in a LPCVD furnace.

7. The method of claim 1 wherein forming a mask layer comprises applying a layer of silicon nitride to the substrate.

8. The method of claim 7 wherein applying a layer of silicon nitride comprises depositing the silicon nitride layer using a low pressure chemical vapor deposition ("LPCVD") process.

9. The method of claim 8 wherein said LPCVD deposition process is carried out using NH_3 and SiH_2Cl_2 gases at a temperature of approximately 835 Deg. C in a LPCVD furnace.

10. The method of claim 1 wherein patterning a mask layer comprises applying a photoresist layer to the mask layer and hard baking the photoresist layer.

11. The method of claim 1 wherein etching the underlying layer comprises using a non-fluorinated gas etch chemistry.

12. The method of claim 1 wherein etching the underlying layer comprises using a hydrogen and bromine etch chemistry.

13. The method of claim 1 wherein etching the underlying layer comprises using a hydrogen bromide etch chemistry.

14. The method of claim 13 further comprising using a chlorine etch chemistry.

15. The method of claim 14 wherein etching comprises flowing hydrogen bromide at a rate of approximately 100 standard cubic centimeters per minute (sccm) and flowing chlorine at a rate between 50 and 125 sccm into a plasma chamber.

16. The method of claim 13 further comprising using a chlorine and oxygen etch chemistry.

17. The method of claim 1 wherein said etching comprises forming a high density plasma using hydrogen bromide etch chemistry, where a high density plasma is a plasma providing sufficient plasma densities to etch sub-micron features while reducing surface damage.

18. The method of claim 1 wherein said etching comprises forming a high density plasma using hydrogen bromide etch chemistry, where a high density plasma is a plasma having an ion density of 10^{10} to 10^{13} ions per cubic centimeters.

19. The method of claim 1 wherein said etching comprises forming a high density plasma using hydrogen bromide etch chemistry using an inductively coupled plasma source.

20. The method of claim 19 wherein said forming comprises flowing said hydrogen bromide gas at a flow rate of approximately 100 standard cubic centimeters per minute in a chamber having a source power source and a bias power source.

21. The method of claim 20 comprising applying a source power between 200 and 500 watts, and applying a bias source power between 50 and 250 watts.

22. The method of claim 1 wherein said etching comprises removing the silicon carbide at a rate between 30 and 120 nm per minute.

23. The method of claim 1 wherein said etching comprises removing the silicon carbide at a rate of at least 100 nm per minute.

24. The method of claim 1 wherein said etching comprises removing the silicon carbide at an etch rate ratio between 1:1 and 20:1 with respect to a silicon dioxide mask layer.

25. The method of claim 1 wherein said etching comprises removing the silicon carbide at an etch rate ratio between 1:1 and 22:1 with respect to a silicon nitride mask layer.

26. A micromechanical device fabricated by a method, comprising:
providing a silicon substrate;
depositing a silicon nitride isolation layer on the substrate;
growing a doped polycrystalline silicon film on the silicon nitride layer;
depositing a silicon dioxide sacrificial layer on the polycrystalline film;
depositing a silicon carbide layer on the silicon dioxide layer;
forming a silicon dioxide mask layer on the silicon carbide layer;
etching the silicon carbide film in a high density plasma chamber using a hydrogen bromide chemistry; and
releasing the device by etching the silicon dioxide sacrificial layer using an hydrofluoric acid release etch process.

27. The device of claim 26 wherein said device is a microelectrmechanical resonator.

28. A semiconductor device, comprising:

a silicon carbide substrate;

a non-metallic mask layer disposed on said silicon carbide layer for patterning said silicon carbide layer; and

a photoresist layer for patterning said non-metallic mask layer.

29. The device of claim 28 wherein said silicon carbide substrate comprises a silicon carbide layer disposed on a silicon substrate.

30. The device of claim 28 wherein said nonmetallic mask layer comprises one of a silicon dioxide or silicon nitride layer.

31. A method of etching silicon carbide, comprising:

providing a silicon carbide substrate;

forming a non-metallic mask layer by applying a layer of material on the substrate;

patterning the mask layer to expose underlying areas of the substrate; and

etching the underlying areas of the substrate with a plasma using a hydrogen bromide etch chemistry at a first rate, while etching the mask layer at a rate lower than the first rate.

32. The method of claim 31 wherein forming a mask layer comprises applying a layer of silicon dioxide to the substrate.

33. The method of claim 31 wherein forming a mask layer comprises applying a layer of silicon nitride to the substrate.